Utah Department of Environmental Quality
Division of Water Quality
TMDL Section

East Canyon Reservoir TMDL

Waterbody ID	**East Canyon Creek**
Location	**Summit & Morgan Counties, Northern Utah**
Hydrologic Unit Code	**16020102**
Pollutants of Concern	**Total Phosphorus** **Dissolved Oxygen**
Impaired Beneficial Uses	**Class 3A: Protected for cold water species of game fish and other cold water aquatic life**
Loading Assessment **Current Annual Average Load** **TMDL Target Annual Avg. Load** **Load Reduction**	 **9,220 lbs. into Reservoir** **5,647 lbs. into Reservoir** **3,573 lbs. (39% reduction)**
Defined Targets/Endpoints	**- 0.025 mg/L in-lake total phosphorus concentration.** **- Dissolved Oxygen at or above 4.0 mg/L in > 50% of water column.** **- Seasonal TSI value between 40 and 50.** **- Algal dominance not blue-green.** **- Annual total phosphorus load equivalent to annual flow w/**

	0.05mg/l concentration.
Implementation Strategy	**WWTP Plant Upgrade and nonpoint source BMP's**

Total Maximum Daily Load for

East Canyon Reservoir

Utah Department of Environmental Quality
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Final April 1, 2000

INTRODUCTION

The upper East Canyon watershed is located in north central Utah approximately 20 miles east of Salt Lake City. The watershed drains 144 square miles of mountainous terrain on the eastern slope of the Wasatch Mountains. The elevation of the watershed ranges from over 10,000 feet in the southern end to approximately 5,600 feet at the reservoir. East Canyon Creek is the principal drainage flowing to the north into the East Canyon Reservoir. The principal drainage channel of the upper part of the watershed in the area of Park City is made up of McLeod Creek which turns into Kimball Creek and subsequently joins East Canyon Creek near the intersection of Interstate 80 and Kimball Creek. All surface water drainage in the watershed is captured in East Canyon Reservoir.

Climate & Streamflow - Average annual precipitation in the watershed ranges from 44 inches in the southern highest elevations to approximately 19 inches in the lower portion of the watershed adjacent to the reservoir (Brooks and others 1998). Approximately 65 to 75% of the annual precipitation occurs during the winter months principally in the form of snow. Streamflows generally peak during the snow melt between March and June. Summer stream flows are mostly derived from ground water discharges.

Water Quality Impairments - The East Canyon Reservoir is listed on Utah's 1998 303d list of impaired water bodies. The specific pollutants or stressors are total phosphorus and dissolved oxygen. This waterbody is included in the "high priority" group for Utah's impaired waters in the 1998 list and thus requires a Total Maximum Daily Load (TMDL) plan to restore beneficial uses and water quality standards.

Portions of this watershed are undergoing explosive growth and development over the last decade. The population has increased over 52% from 1980 to 1990 (Brooks 1998). Growth from 1990 to present appears to be at even a greater rate, particularly in light of preparations for the 2002 winter Olympics. Park City will host several venues for these Olympic games.

Statement of Intent - This TMDL will address the water quality impairments for the East Canyon Reservoir for dissolved oxygen and total phosphorus and is submitted to the Environmental Protection Agency in accord with the requirements of section 303d(1) of the Clean Water Act.

WATER QUALITY STANDARDS & IMPAIRMENTS

The Utah Division of Water Quality (DWQ) has classified significant waterbodies in Utah in order to assure protection of beneficial uses as follows:

Table 1. Utah Water Quality Classifications/Beneficial Uses

Class 1	Class 1C: Protected for uses as a raw water source for domestic water systems
Class 2	Recreational and Aesthetic Use
	Class 2A: Protected for primary contact recreation such as swimming.
	Class 2B: Protected for secondary contact recreation such as boating, wading, or similar uses.
Class 3	Protected for use by aquatic wildlife.
	Class 3A: Protected for cold water species of game fish and other cold water aquatic life, including the necessary aquatic organisms in their food chain.
	Class 3B: Protected for warm water species of game fish and other warm water aquatic life, including the necessary aquatic organisms in their food chain.
	Class 3C: Protected for non- game fish and other aquatic life, including the necessary aquatic organisms in their food chain.
	Class 3D: Protected for waterfowl, shore birds and other water-oriented wildlife not included in Classes 3A, 3B, or 3C, including the necessary aquatic organisms in their food chain.
	Class 3E: Severely habitat-limited waters. Narrative standards will be applied to protect these waters for aquatic wildlife.
Class 4	Protected for agricultural uses including irrigation of crops and stock watering.
Class 5	The Great Salt Lake. Protected for primary and secondary contact recreation, aquatic wildlife, and mineral extraction.

East Canyon Reservoir has been classified with beneficial uses of 1C, 2B, 3A and 4

In addition, Utah DWQ has promulgated state rules that define acceptable water quality in "Standards of Quality for Waters of the State" (Utah Administrative Code R317-2). The applicable standards of focus for this TMDL for East Canyon Creek are noted in Table 2.

Table 2. Water Quality Standards Impaired in East Canyon Reservoir

Parameter (units are mg/l)	Class 3A Cold Water Fisheries
Total Phosphorus *	.05 (stream) .025 (lake)
Dissolved Oxygen	6.5 (30 day Avg.) 9.5/5.0 (7 day Avg.) 8.0/4.0 (1 day Avg.)

*Total Phosphorus is a pollution indicator that is considered along with other corroborating parameters in order to determine if impairment exists

East Canyon Reservoir has been listed on Utah's 303d list for total phosphorus and dissolved oxygen. The dissolved oxygen problem is primarily the result of excessive nutrients in the water column. While phosphorus is not the limiting nutrient at this time (Judd 1999), the control of phosphorus is the most appropriate approach to reduction of the excessive biological production in the reservoir.

Water Quality monitoring at several stations along East Canyon Creek and upstream main stem tributaries has been ongoing since 1980. The data record selected for this TMDL is from January 1, 1993 to June 16, 1999. This period is reflective of more recent water quality for the creek and is concurrent with the most recent growth pattern of this area. The data set is comprised principally of data collected through the Division of Water Quality sampling program. Some of the more recent samples have been collected by the Snyderville Basin Sewer Improvement District and Bio-West Inc. (a consultant for DWQ). Except for a few samples collected in the spring of 1999 by SBSID, all of the laboratory analysis has been conducted by the Utah State Laboratory for all sampling programs. Figure 1 is a map of the watershed that includes the locations of the sampling stations where data was collected.

A cursory, synoptic survey was conducted during the fall of 1999 under contract with BIOWEST attempting to further quantify total phosphorus loads from nonpoint sources for episodic events. Although the information obtained during this survey indicates that existing monitoring may have underestimated the contribution of nonpoint sources of pollutants because episodic event monitoring was not conducted, it should also be noted that the survey itself was not designed to provide data definitive of the episodic event both spatially and temporally. Samples obtained were grab samples typical of routine

monitoring, but were taken during a limited number of storm events. The data obtained is cursory and substantiates the conclusions associated with urban and stormwater runoff as indicated in the Clean Lakes report. The Clean Lakes report did indicate that the magnitude of nonpoint sources contributions to the loading varied on an annual basis dependant upon the hydrology. It is a recognized fact that loadings from these sources is significant and efforts need to be directed to control pollutants from these sources if beneficial uses are to be attained in this watershed.

Sections 4.0 and 5.0 of the East Canyon Reservoir Diagnostic Feasibility Clean Lakes Study report (Judd 1999), contain a detailed evaluation and discussion of the specific information relating to the impairments of water quality that exist in the East Canyon Reservoir. In summary the reservoir is impaired from excessive nutrient loads that are responsible for increased productivity in the reservoir. More specifically the increased nutrients have fostered an excessive production of algae with resultant problem of low dissolved oxygen.

Total Phosphorus - Figure 1 shows in lake concentrations of total phosphorus measured at the sampling station 492516 which is located adjacent to the East Canyon Reservoir Dam. The heavier horizontal line is a reference point at the 0.025 mg/l state indicator value for in lake total phosphorus. The majority of the samples show phosphorus concentrations well above the state indicator level of 0.025 mg/l. As discussed previously, the 0.025 mg/l phosphorus value is not a formal Utah water quality standard but is used in conjunction with other factors to assess water quality impairment. The average in lake concentration of total phosphorus for East Canyon Reservoir is 0.117 mg/l for the years of 1994 through 1997 (Judd 1999).

Trophic State Index - Another indicator of nutrient induced impairment of the reservoir is the use of trophic state indicators such as the Carlson TSI value. This value is generally looked at as a composite of three measurements of total phosphorus value, secchi depth and chlorophyll - a values. TSI values greater than 50 are generally considered to be eutrophic. The composite TSI value for the East Canyon Reservoir has been in the low 50"s since 1994 with a slight upward trend each year. The 1997 composite TSI for East Canyon Reservoir was 54.52 (Judd 1999).

Algal Dominance - Another biologic indicator of impairment is the dominance of blue-green algae that is occurring in the reservoir. Section 5.5 of the Clean Lakes report details the sampling and results on phytoplankton. One of the goals of this TMDL is to shift the algal dominance away from blue-green algae.

Dissolved Oxygen - Appendix E of the Clean Lakes report contains information that shows a significant dissolved oxygen depletion in much of the lower portions of the water column during much of the year. Elevated temperatures near the surface of the reservoir in the summer time place a significant limitation on available water column for fishery habitat. As depicted and discussed in the Clean Lakes report (p3) extensive dissolved oxygen depletion are typically present in the reservoir during the productivity

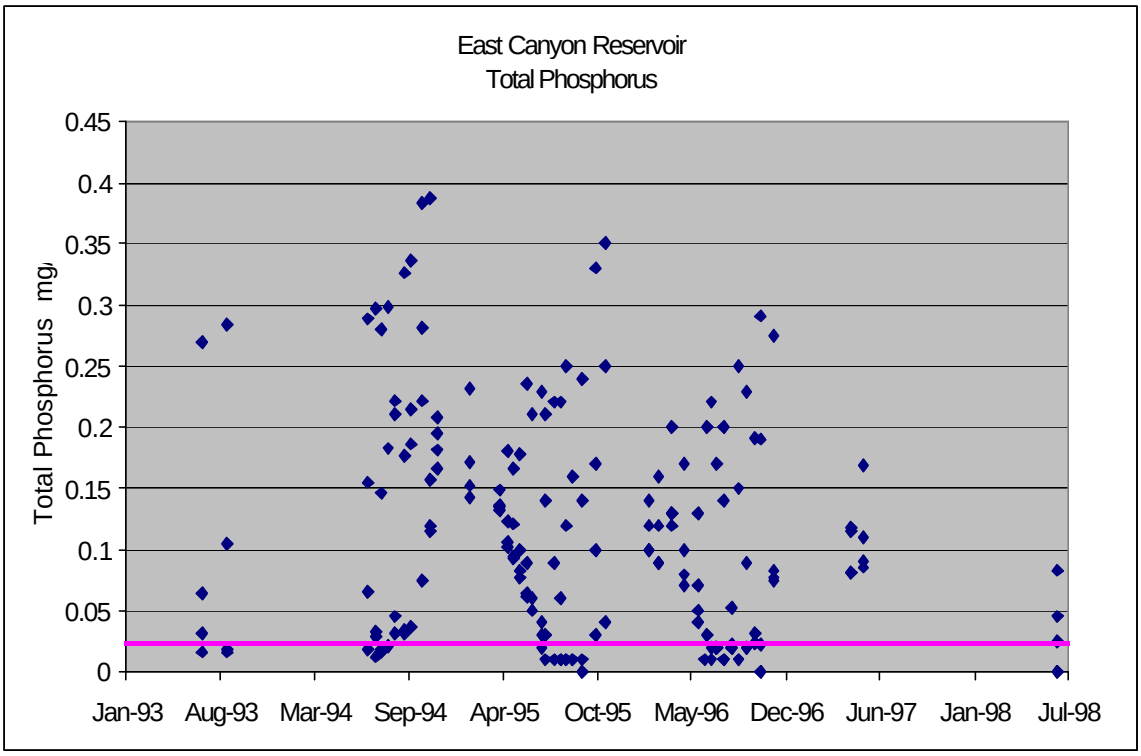

Figure 1. Total Phosphorus values from reservoir sampling; includes all depths sampled at station 516 closest to the East Canyon Reservoir Dam. Utah "in lake" indicator value of 0.025 mg/l is shown with heavier horizontal line.

period and with the elevated temperatures near the surface, fishery habitat is limited.

WATER QUALITY TARGETS/ENDPOINTS

The following table from the East Canyon Reservoir Diagnostic Feasibility Clean Lakes Report (Judd 1999) lists the endpoints selected for this TMDL. Documentation supporting the selection of these endpoints is contained in the Clean Lakes Report.

Table 3. East Canyon TMDL Endpoints (From Table 21 Clean Lakes Report (Judd 1999))

TMDL Endpoints for East Canyon Reservoir				
Description	Waterbody Biota	Total Phos. (mg/l)	Dissolved Oxygen (mg/l)	Misc. Endpoints
East Canyon Reservoir	Algal Dominance not blue-green	In lake concentration < 0.025 mg	Instantaneous water column values at deep site > 4.0 mg/l for > 50% of water column	Overall productivity seasonal TSI value = 40 to 50; Annual loading equivalent to annual flow with 0.05 mg/l total phosphorus

SIGNIFICANT SOURCES

Total Phosphorus - Seasonal total phosphorus loadings for eight sampling locations, 6 main stem and two tributaries sampling sites were compiled by BIOWEST for the period of 1993 through 1999. Table 4 from the BIOWEST report shown below reveals that the majority of the loading in this system occurs between stations 526 and 523 where the only point source discharge enters the system. Data obtained from the Snyderville Basin Sewer Improvement District for discharges from the East Canyon Wastewater Treatment Plant (WWTP) correlates with this estimate showing annual loading rates of total phosphorus in the period 1997 through 1999 of 3.82 tons per year. This constitutes the greatest single source of the total annual load to the system.

The nonpoint sources of total phosphorus have been investigated by BIOWEST during the 1999 field season. The most notable nonpoint sources appear to be stormwater runoff from construction disturbed sites in the upper watershed. This nonpoint part of the load constitutes a significant portion of the estimated annual total phosphorus load for the watershed. It should be noted that based on limited storm event sampling conducted by BIOWEST in the fall of 1999, significant loads from rainfall events are not well be reflected by the current data set used to estimate annual loads. Table 5 from the BIOWEST report shows loading calculations for the storm event sampling stations that were studied in the fall of 1999. A more detailed discussion of nonpoint sources is contained in the BIOWEST NPS report.

Regardless of the precise proportions of the total load contributed by point sources and nonpoint sources, sufficient data exists to conclude that both the point source and nonpoint sources are significant source issues and both must be addressed by this TMDL.

Table 4. Phosphorus and Sediment Loads at Existing Water Quality Stations
(From Table 7 BIOWEST NPS Report (Olsen and Stamp 2000)

Main Stem Phosphorus Loads (tons) (Existing Monitoring Stations)					Main Stem Sediment Loads (tons) (Existing Monitoring Stations)		
Station	**Drainage Area (mi^2)**	**Spring Runoff (t/y)**	**Base Flow (t/y)**	**Total Annual Loads (t/y)**	**Spring Runoff (t/y)**	**Base Flow (t/y)**	**Total Annual Loads (t/y)**
515	**144.00**	**2.29**	**3.20**	**5.49**	**101.90**	**142.50**	**244.40**
519	**113.30**	**3.20**	**2.08**	**5.28**	**729.70**	**130.30**	**860.00**
523	**59.30**	**3.02**	**1.87**	**4.89**	**358.90**	**52.10**	**411.00**
526	**51.30**	**0.88**	**0.26**	**1.14**	**285.10**	**42.70**	**327.80**
536	**12.00**	**0.13**	**0.060**	**0.19**	**44.30**	**15.07**	**59.37**
537	**12.20**	**0.37**	**0.01**	**0.38**	**68.04**	**3.13**	**71.17**
544	**8.78**	**0.32**	**0.16**	**0.48**	**133.70**	**44.90**	**178.60**
Toll Cr.	**5.50**	**0.18**	**0.12**	**0.30**	**38.10**	**14.10**	**52.20**

Table 5. Sediment and Phosphorus Loads at the New Source-Specific Water Quality Stations. (From Table 9 BIOWEST NPS Report (Olsen and Stamp 2000)

Sub-Basin Phosphorus Loads						**Sub-Basin Sediment Loads**			
Station	Drainage Area (mi^2)	Spring Runoff (t/y)	Average Storm Event (t/y)	Base Flow (t/y)	Total Annual Loads (t/y)	Spring Runoff (t/y)	Average Storm Event (t/y)	Base Flow (t/y)	Total Annual Loads (t/y)
TH	1.00	N/A	1.03	0.02	2.05	N/A	48.50	4.30	52.80
ST	0.50	N/A	0.01	0.17	0.68	N/A	0.90	32.10	33.00
MA	1.90	N/A	0.32	0.14	2.36	N/A	109.70	48.50	158.20
RC	0.40	N/A	0.01	0.07	0.48	N/A	5.80	13.40	19.20
CC	5.2 (Thaynes)	N/A	0.00	0.02	5.22	N/A	50.20	4.30	54.50
PC	5.2 (Thaynes)	N/A	0.00	0.02	5.22	N/A	2.20	7.60	9.80
PM	0.90	N/A	0.02	0.03	0.95	N/A	4.30	16.00	20.30
WP	6.30	N/A	0.00	0.02	6.32	N/A	0.90	5.20	6.10
WD	2.70	N/A	0.01	0.01	2.72	N/A	5.80	2.70	8.50
SC	1.00	N/A	0.00	0.03	1.03	N/A	1.90	4.70	6.60
U1	0.40	N/A	0.00	0.00	0.40	N/A	0.50	0.06	0.56
U2	0.10	N/A	0.00	0.00	0.10	N/A	1.90	0.04	1.94
TM	2.20	N/A	0.01	0.01	2.22	N/A	12.60	3.10	15.70
TC	5.50	N/A	0.02	0.04	5.56	N/A	37.30	5.50	42.80
KC	12.00	N/A	0.01	0.14	12.15	N/A	1.70	23.50	25.20

N/A= data not available
It should be noted that total annual loads are underestimated due to lack of spring runoff data for nonpoint source loads.

TECHNICAL ANALYSIS

The impairments identified with East Canyon Reservoir are primarily expressed in excessive biological activity. Specifically, algal growth during the summer season results in dissolved oxygen levels falling below state standards throughout much of the lake profile for major parts of the year.

Seasonality - The impairments observed in East Canyon Reservoir are exhibited seasonally normally during the summer months when day length affords sufficient light inputs, and when surface temperatures in the reservoir are at their maximum. However, in a reservoir setting like East Canyon, the reservoir acts as a sink or bath tub for material including nutrients that come from the upstream watershed throughout the year. In addition, in lake sources of nutrients are expected to contribute to biologic

productivity given the semi-annual lake turn over that mixes the entire water column of the reservoir. Accordingly, annual compilation of data for loadings will be considered in deriving the TMDL for the reservoir. However, it should be noted that endpoint (algal dominance, trophic state index, dissolved oxygen concentrations, total phosphorus concentration) evaluation will be based on data obtained during the productivity season (May through September).

Growth - The upper portion of the East Canyon Watershed has experienced explosive growth over the last 5 to 10 years. Projections for growth compiled by the Mountainlands Association of Governments show projected population growth from the years 2000 to 2020 for the Park City area of 52% (6,750 to 10,246 residents). The Snyderville Basin area outside Park City boundaries is not specifically noted in the growth projections available. However, the same projections show un-incorporated portions of Summit County growing 103% between the years 2000 to 2020. From the Jeremy Ranch area downstream to the East Canyon Reservoir (over half of the watershed) little growth is presently occurring. The land use information compiled in the NPS study performed by BIO/WEST shows virtually all of the lower portion of the watershed as forested and semi-active agriculture. Most of the lower watershed is contained in Morgan County. Growth projections for Morgan County compiled by Wasatch Front Regional Council between 2000 and 2020 show projections of around 50%. However, the majority of this growth will most likely occur below the East Canyon Reservoir, indicating that the growth rate of the lower half of the watershed between the Snyderville Basin and the reservoir will be quite modest. Using a population weighted average for Park City (52% growth rate) and the Snyderville Basin (103% growth rate) and not factoring in the much smaller growth rates expected for the lower watershed, a growth rate of 80% will be used for purposes of this TMDL. This growth rate is expected to be somewhat overestimated for the overall watershed and is consistent with use of conservative assumptions to allow for a margin of safety in TMDL calculations.

The estimation of overall growth incorporates the assumption that future land disturbing activities will be in proportion with population growth. Several high profile projects are either under construction or are planned for construction over the next several years. These include a proposed pipeline project to bring water back up into the Snyderville Basin from East Canyon Reservoir, 2002 Olympics related venues, road construction projects, as well as recreational sites such as golf courses. Careful focus will need to given to these higher profile projects to assure that impacts to water quality is minimal. Coordination with the Snyderville Basin Planning Commission to assure that new projects include comprehensive stormwater controls for both the construction and operation phases must be undertaken to assure that the cumulative impacts of these projects does not erode the assumptions used for growth or the margin of safety set aside for uncertainty. In addition, DWQ will need to utilize all provisions of the UPDES

Stormwater program to assure projects implement needed controls and design to minimize water quality impacts.

East Canyon WWTP Growth - The Snyderville Basin Sewer Improvement District East Canyon Wastewater Treatment Plant annual discharges are presently just under 2 MGD average annual flow. The final build-out of the plant has not been officially determined. The current expansion design for the plant is for 4 MGD with ultimate build out at 8 MGD. Projected growth of the plant indicates the 8 MGD capacity could be reached close to the year 2020. Growth of plant discharges from the current 2 MGD capacity to 8 MGD capacity would be a growth rate in excess of 100% which is higher than population growth projections for this area. The actual flows that are processed by the plant are controlled by several factors not directly tied to population growth. The capacity of the plant is affected by the number of nonresident recreational visitors to this area. There are two plants operated by SBSID for this area. The flows from portions of the upper watershed can be directed to either plant. Water rights restrictions dealing with transfer of waters to another basin may also determine the ultimate build out for the WWTP. Further, August flows during the critical season for this TMDL will range from about 70 to 80% of plant capacity.

The TMDL for East Canyon Creek provides a target of 0.05 mg/l total phosphorus after mixing below the East Canyon Waste Water Treatment Plant. Use of this target would assure that phosphorus loading into the reservoir is reduced to a level that will meet the requirements of the endpoints for the reservoir TMDL.

To supplement the linkage between the endpoint selected for total phosphorus in the creek and the endpoints selected for the reservoir, modeling of several scenarios utilizing a stream and reservoir computer model was completed by Utah State University. This model was comprised of QUAL2E for the stream and a reservoir model developed by USU for the reservoir. Table 8 shows the results of the various inputs and conditions modeled and the resulting TSI value predicted for the reservoir.

Total annual phosphorus loads into the reservoir have been estimated by BIOWEST in the recent NPS study. Average annual total phosphorus loads for the period 1993 through 1998 as measured at station 492519 are 10,560 lbs. per year. In the end of July 1996 the East Canyon Wastewater Treatment Plant implemented biological treatment of their effluent to lower phosphorus levels. Using the same methodology that BIO/WEST used but with the data set segmented into pre-biological and post biological treatment, revised annual load estimates before and after the treatment plant upgrade are shown in Table 6.

The Clean Lakes Report for East Canyon Reservoir includes an estimate of nonpoint source annual total phosphorus loading above the WWTP of 3,790 lbs.

Table 6. Total Annual Phosphorus Loads Entering East Canyon Reservoir

Time Period	Annual Total Phosphorus Loading to the Reservoir lbs./year
1994 - 1999 average	10,560 lbs.
Annual average prior to Biological Trtmt.	12,500 lbs.
Annual average after Biological Trtmt.	9,220 lbs.

Table 8 . USU Modeling Results

TOTAL MAXIMUM DAILY LOAD

Judd (1999) has proposed an average annual loading value of total phosphorus into the reservoir of 5,647 pounds. This number is derived from the long term annual yield of the watershed to the reservoir of 41,520 acre feet at an average total phosphorus concentration of 0.05 mg/l. This is an average annual target; the actual annual loads will vary depending on the actual water yield. Use of this target allows the following TMDL average annual total phosphorus allocation of loads:

Table 7. TMDL Allocation

Total Phosphorus: Average Annual Load Target for Reservoir				
Sources	Total Phosphorus Pounds/Year	Percent of Total Load	Total Phosphorus Pounds/Year	Percent of Total Load
East Canyon WWTP	1,462 lbs.	26%	1,462 lbs.	26%
Nonpoint Sources	2,274 lbs.*	40%	1,895 lbs.**	33%
Reserved for Growth	1,819 lbs.*	32%	1,516 lbs.**	27%
Margin of Safety	92	2%	774	14%
Total Annual Load	5,647 lbs.		5,647 lbs.	

1. The Point Source allocation for the WWTP is calculated using an average concentration of 0.06 mg/l effluent concentration corresponding to the East Canyon Creek TMDL. Plant growth up to total build out of 8 MGD is included in this calculation.

2. The nonpoint source load allocation is calculated from the long term nonpoint source estimate (3,790 lbs./year) less a 40% (*) and 50% (**) option reduction from the planned implementation of BMP's. We have included two options to demonstrate the flexibility and extent of the margin of safety dependant upon the effectiveness of BMP's to control movement of total phosphorus.

(3790 lbs. x (1 - .4) = 2,274 lbs. for the 40% reduction option column
(3790 lbs. x (1 - .5) = 1,895 lbs. for the 50% reduction option column

3. The growth allocation for nonpoint sources is based on growth projections for Park City and the Snyderville Basin (80%). The allocation is calculated from NPS loads after application of BMP's multiplied by an 80% growth factor.
(2,274 lbs. x 0.80 = 1,819 lbs.)
(1,895 lbs. x 0.80 = 1,516 lbs.)

4. The margin of safety allocation will address uncertainty from:

Total Phosphorus loading estimates may be adjusted upward based on additional sampling from spring runoff and rainfall events.
The ability of the WWTP to meet an effluent concentration limit of 0.06 mg/l is uncertain given best available technology currently available. If this limit cannot be achieved, the load allocation for the point source can utilize a portion of loading set aside in this margin of safety.

MARGIN OF SAFETY

The Margin of Safety used in this TMDL is achieved in a twofold manner. The first aspect is through the incorporation of conservative assumptions in the calculations and approaches utilized in the TMDL for East Canyon Creek. These include the following:

1. The loading calculation for the East Canyon WWTP is based on a concentration limit that uses the worst case condition and season for analysis; low flow (8.0 cfs) for stream, August through September values for assessing stream impacts. In most years the flow regime will be higher and provide for greater dilution of phosphorus discharged from the plant with lower concentrations of upstream water.

2. Use of conservative value of 50% to reflect NPS load reductions from the implementation of Best Management Practices to reduce nonpoint source pollution sources. The range of values from the BIOWEST NPS report ranged from 40% to 90% reductions of total phosphorus for all land uses except active agriculture. Impacts of active agriculture are diminishing with land use changes in the watershed from agriculture to more development and recreational uses. The NPS report shows active agriculture comprises 2% of the land use in the watershed. Effectiveness of agriculture land use BMP's for reduction of NPS total phosphorus ranged from 10 to 70% in the BIOWEST report.

3. An ongoing monitoring program will be implemented to assure the specified endpoints are being achieved. If monitoring reveals that the TMDL values selected in this document are not being achieved, this TMDL will be revisited and revised limits derived to assure endpoints will be achieved and Utah water quality standards are restored in the reservoir.

The second aspect of the margin of safety used for this reservoir TMDL is the actual allocation of 92 or 774 pounds per year total phosphorus as a set aside load, shown and explained in the preceding discussion that allows for target load allocation for other sources dependant upon the effectiveness of practices or best available technology. It is reserved as part of the margin of safety.

IMPLEMENTATION MEASURES

The implementation measures identified in the TMDL for East Canyon Creek will address the reservoir TMDL also. There are no added implementation measures beyond those noted for the East Canyon Creek TMDL for the reservoir.

PUBLIC PARTICIPATION

The public participation process for this TMDL was addressed through the use of a series of public meetings and a local watershed committee. The East Canyon Water Quality Steering Committee has been in operation for several years prior to this TMDL. The committee is comprised of individuals that represent a broad based and diverse cross section of the interested stake holders in the watershed. All of the committee meetings are open to the public. The focus of the most recent meetings held on January 5 and February 9, 2000 was the nonpoint source study completed by BIOWEST and the draft TMDL.

In addition the Division of Water Quality in coordination with the East Canyon Water Quality Steering Committee held public meetings to provide information and education on the TMDL process and to take comment on the draft TMDL. The first set of meetings were held on the evenings of December 7 and 14, 1999 in the Park City area and in Morgan Utah respectively. The primary purpose of these meetings was to advise the public that a TMDL was being compiled, the issues to be considered and addressed, and the time frames for compiling the TMDL. Attendance at these two meetings was good with over 75 people at the Park City meeting and over 28 at the Morgan meeting.

A second public meeting was held on February 28, 2000 in the Park City area to discuss and take comment on the draft TMDL. Attendance at this meeting was over 60 people.

Each of the public meetings were advertised in local news media. A letter of invitation and Information Update was also sent to over 80 interested citizens advising them of the meetings. A copy of the letter and Information Update sent out for the December meetings is attached.

Attached to both of the TMDL's for the East Canyon Watershed are the comments and a summary of responsiveness for those comments received during the comment period on the draft TMDL's.

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